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No. 17

Selected Translations on Farm Machinery Plants

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[Following is a translation of selected articles from the Russian-language periodical Mashinostroitel' (Machine Builder), Moscow, No. 2, February 1960. Page and author are given under individual article headings.]

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I. AUTOMATION OF WELDING PROCESSES AT THE ROSTSEL'MASH PLANT

Pages 10-11

N. I. Kurbatov,
head of Automation Bureau
and
V. T. Kochka,
manager of the Welding Department of the Central Plant Laboratory

The machines turned out by our plant are characterized by a large volume of welding work. It is sufficient to say that in the SK-3 self propelled combine over 400 units are manufactured by the welding method, making up 40-45 percent of the general weight of the combine. In one day of welding work the plant accounts for 20 km. of arc welding seams, over 1.5 million welded spots, and over 100,000 electric rivets.

In accordance with the resolutions of the Party and government the plant must by 1965 mechanize welding operations by 80 percent and organize model welding production.

In the present article we shall examine typical examples of the work of the plant collective in mechanizing and automating welding operations.

Automatic equipment for welding augers. The spiral blade is welded to the auger rod on a special automatic machine (figure 1). The auger is sent to the automatic machine in assembled form and is mounted in the processing mechanism. A pressure roller affixed to the spiral blade keeps the bit of the welding heat at a distance of 20 mm. from the joint of the blade with the rod. On the welding head is suspended a special device for retaining and spreading the flux. Pressing a button turns on a rotor, a wire feeder, and the welding arc.

During rotation of the auger the pressure roller, rigidly attached to the welding head, presses against the spiral blade by means of a pneumatic cylinder 10, which keeps the welding head moving along the axle of the auger. When the welding process is completed the welding arc is switched off, the mechanism is stopped, and the device for retaining the flux is removed. The rotating center is moved by the pneumatic cylinder 13 to the right. Then the welded auger is lowered and deposited on a shelf.

By this method 12.5 meters of seam are welded on all the augers of a combine. The productivity per shift of a single operator on two of these automatic machines is 350-400 augers with over 500 meters of seam.

To do this amount of work by hand would require 4 to 5 highly skilled welders.

Automatic equipment for welding ring seams with flux. The combines and straw pilers manufactured by the plant have a large number of units, such as pulleys, disks, and couplings which are joined by ring seams. Plant workers have designed and introduced all-purpose automatic welding machines for welding these seams (figure 2).

The unit to be welded is mounted on a platform and attached with changeable clamps adjusted to the diameter of the hub. The welding speed is changed with the aid of changeable reducing gears and pinions. Feeding and drawing off of flux are automatic. Capacity of the machine with a hub diameter of 40 mm. is about 450 units per shift or twice as great as by hand arc welding, and the quality of welding is immeasurably higher. Automatic welding does away with the need to clean parts after welding. The volume of seam welding per machine manufactured is more than 3 meters.

The plant has also designed and introduced into production automatic equipment for welding straight-line seams with flux on pitman rods, straw piler levers, and 102 x 5 diameter pipes. The volume of such welding work per manufactured machine is about 4.5 meters.

All the described equipment uses standard type ABS, AB, and A welding heads.

Recently the plant has placed under wide application an advanced method of semiautomated welding using carbonic acid. The following semiautomatic machines, designed by the E. O. Paton Electrical Welding Institute, were introduced: the A-537 model for welding combine pulley disks; and the A-547 model for welding sleeves of different capacities, instead of binding with expensive solders. Labor productivity with semiautomatic welding using carbonic acid has increased by 1.5-2 times in comparison with hand arc welding.

In cooperation with scientists of the Rostov Institute of Agricultural Machine Building plant workers have designed automatic equipment for electrical riveting.

Of great interest is a conveyer designed by the plant for assembling and spot welding, in which combine straw shaker teeth are welded with type MTPG-75 suspended welding machines (figure 3). Introduction of this conveyer has more than doubled labor productivity.

The application of automated and semiautomated arc welding, the use of spot welding machines with an automatic cycle, welding on conveyers, and other methods have enabled the plant to mechanize 50 percent of welding work by the end of 1959, instead of the planned 40 percent.

FIGURE APPENDIX

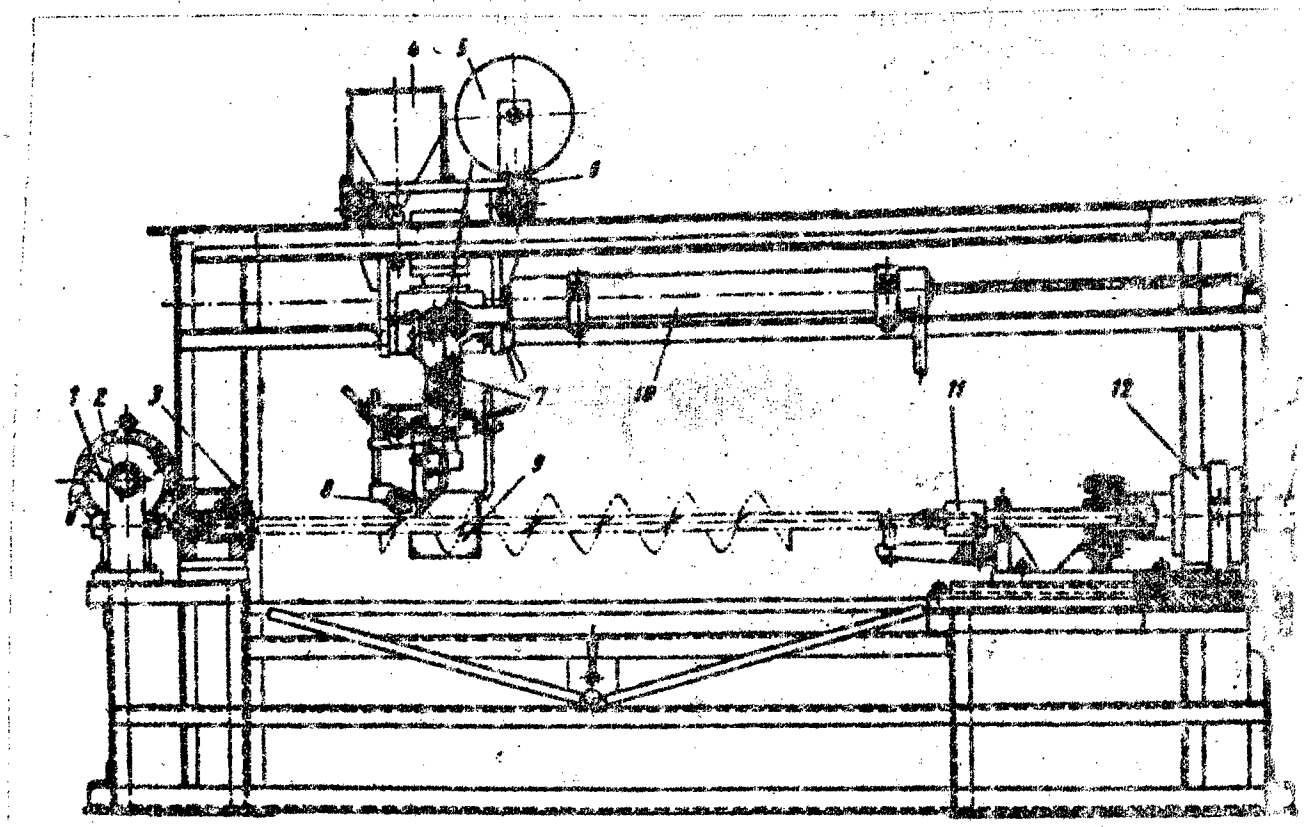

Figure 1. Automatic mechanism for welding spiral blade to auger: 1--electric motor; 2--reducing gears; 3--clamp; 4--flux hanker; 5--wire reel; 6--cart; 7--feeding mechanism; 8--pressure roller; 9--device for retention of flux; 10--pneumatic cylinder; 11--revolving center; 12--rear chuck; 13--pneumatic cylinder; 14--framework

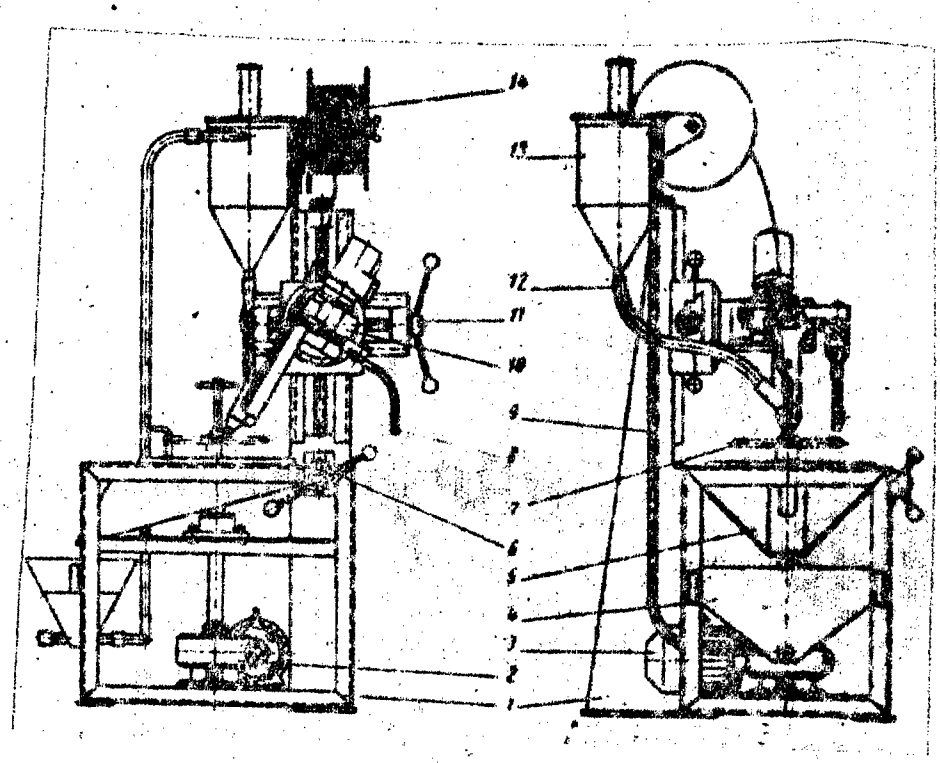

Figure 2. Automatic mechanism for welding ring seams:

1--mount; 2--reducing gears; 3--electric motor; 4-5--flux collector; 6--device for raising head; 7--unit to be welded; 8--current feeder; 9--hose for feeding flux into the bunker; 10--welding head; 11--mechanism for adjusting welding head; 12--hose for feeding flux to place of welding; 13--bunker; 14--wire reel

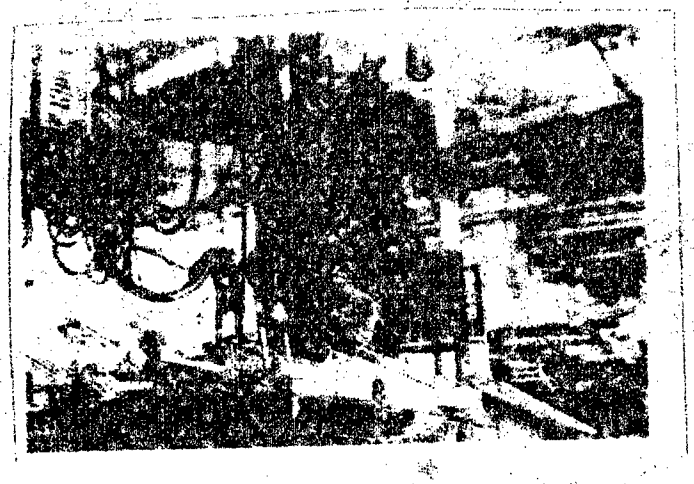

Figure 3. MTTC-75 suspended welding machine.

II. MODERNIZATION OF MULTIELECTRODE SPOT-WELDING MACHINES

Page 22

I. I. Pokhitonov,
engineer

For welding units and other large parts of the SK-3 combine the Rostsel'mash Plant employs type MTMT, MTMK, MTMB, and MTMZh multielectrode welding machines (figure 1). The machines are equipped with 6 to 12 welding transformers with a capcity of up to 200 kw. each or a capacity of 1,200 kw. per separate machine.

The control diagram of the machines is based on simultaneous welding by all the electrodes or of separate groups. Loading the machines to 80-90 percent of capacity by means of sub power stations used to be impossible without expanding the substation and installing large-dimension cables.

The power supply department of the plant developed an electrical schematic permitting alternating switching on of transformers, so as not to interrupt welding operations scheduled by the plant (figure 2). Modernization of the welding machine under the new schematic makes it possible to feed current into the machine without disturbing technological planning arrangements, which do not make allowances for expansion of substations. Modernization also permits use of 70 mm^2 wire for feeding current instead of 240 $mm.^2$ cable and also permits economies through use of one complex of ignition switches per machine.

The control diagram provides for automatic switching on of each transformer. Switching on each transformer proceeds through an ignition switch, which automatically alternates the transformers.

In this way, upon a single pressing of a pedal, the full welding cycle is carried out with alternate switching on of a set number of transformers.

FIGURE APPENDIX

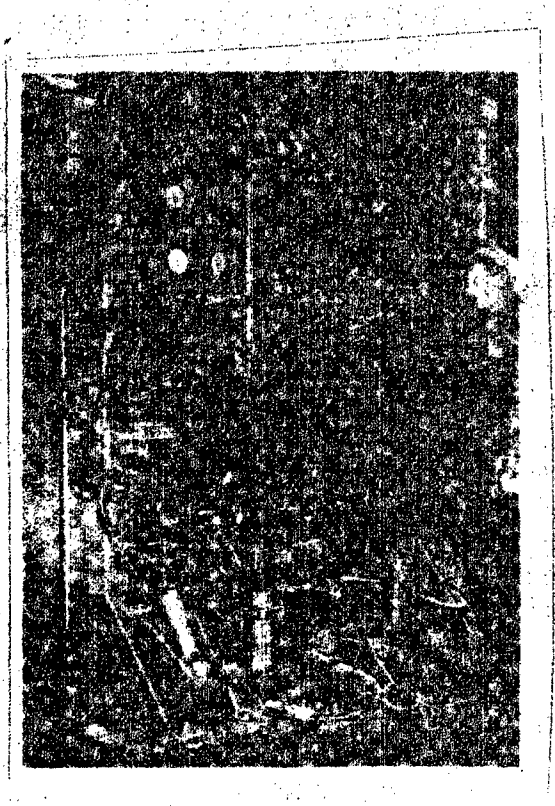

Figure 1. Multielectrode welding machine

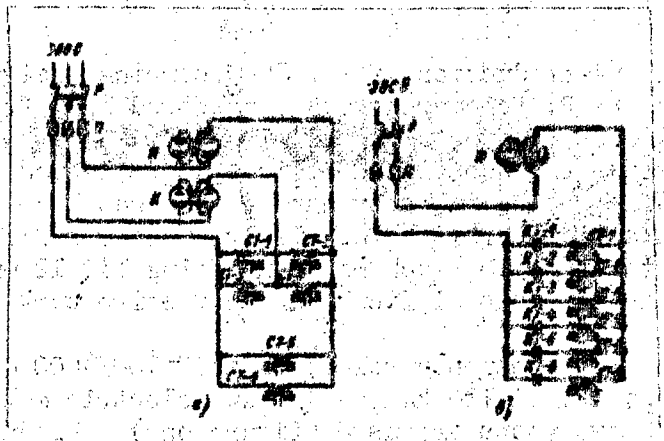

Figure 2. Electrical schematic of machine

a. before modernization b. after modernization

III. HIGH FREQUENCY SOLDERING OF HYDRAULIC SYSTEM TUBING ON THE SK-3 GRAIN COMBINE

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V. A. Shadchinev,
assistant director
of Department of
Mechanization,
Automation, and
Machine Tool Building
of the Rostov Agri-
cultural Machinery
Plant

In the production of the SK-3 combine designers G. M. Gissin and B. P. Ponomarenko have proposed high frequency soldering of sleeves to hydraulic system tubes.

Before the adoption of this system sleeves were soldered to hydraulic system tubes by hand with a gas burner, using brass rods with a diameter of 2 mm. Twelve highly skilled workers were assigned to this job, each man completing 180 12 mm. tubes per shift. The work was difficult and defective work amounted to 10 percent.

In high frequency soldering a PV 100/8000 machine generator with a capacity of 100 kw., a 130 kw. electric motor, and a control panel with two posts are used (figure one). Productivity of the apparatus per shift is 800-850 tubes, and the proportion of defective output is reduced to 5 percent.

The technique of soldering with this equipment is as follows. The sleeve is attached manually to the inductor device. Then a brass washer is put on the end of the tube and submerged in 10-15 mm. of warm water. After being moistened the tube with the brass washer is placed in borax powder and the end of the tube is inserted in the sleeve attached to the inductor device. The starter button switches on the inductor, producing heat in 2 or 3 seconds. The fused washer fills the gap between sleeve and tube. The inductor is turned off and within 2-3 seconds cooling is carried out. Then the pipe with the sleeve is removed from the inductor device and cooled in a water bath. The process is repeated. The hydraulic tubing is tested under a pressure of 75 atmospheres. V. P. Lysenko, repair worker at the spare parts shop, invented an original device for securing the tube and sleeve during high frequency heating (figure 2).

The device operates as follows. The sleeve is set on a cone and the tube is inserted into the sleeve. During fusing of the brass washer the metal cannot flow into the sleeve opening because of the presence of the cone. Because of this, cooling of the

sleeve and tube after removal from the inductor takes only 1-2 seconds instead of 3-4 seconds.

After many attempts success has been attained in preventing flowing of the fused washer along the outer surface of the sleeve. This flowing used to require additional cleaning of the surface with a file or abrasive. This defect has been eliminated, with the result that the sleeve mounted on the inductor device can be raised 2 mm. higher than the inductor axis.

At present the plant has set up similar equipment for soldering sleeves to tubes 19 mm. in diameter. Productivity of this equipment is 700-750 tubes a shift on two inductors. As experience has shown, the use of high frequency soldering of hydraulic system tubing is economically advantageous and makes for high productivity and good quality of work.

FIGURE APPENDIX

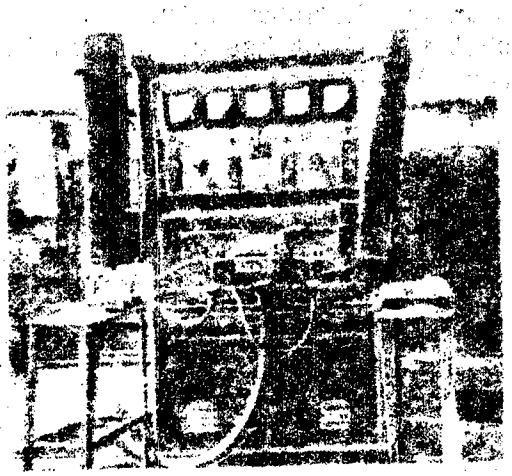
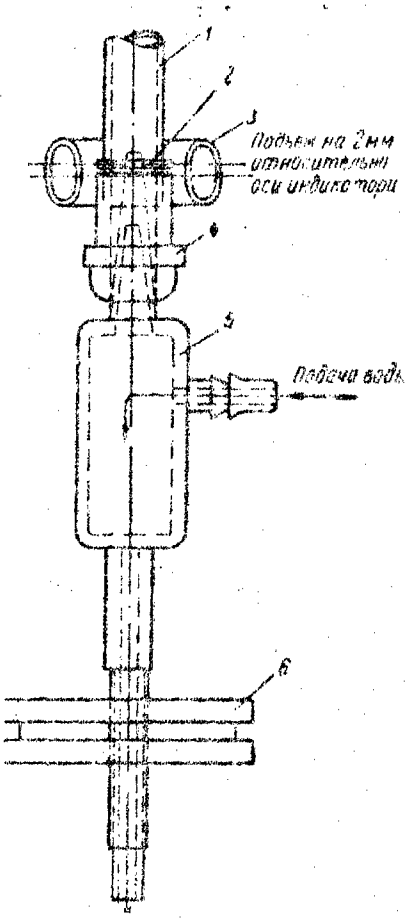


Figure 1. Control panel with two posts



Raised 2 mm. above the axis of the inductor

inflow of water

outflow of water

Figure 2. Device preventing overflow of washer:

1--pipe; 2--brass washer; 3--copper inductor; 4--steel sleeve; 5--device for holding pipe and sleeve; 6--nut for tightening device.

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- END -